

# T1 Structured CES with Synchronous Clocking and Soft PVCs

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## **Introduction**

This document provides a sample configuration of Structured Circuit Emulation Services (CES) that uses Synchronous clocking and a Permanent Virtual Circuit (PVC). Structured service, which is also called channelized T1/E1 or cross-connect, is designed to emulate point-to-point Fractional T1/E1 (Nx64k) connections. This allows the T1/E1 to break into multiple DS-0 channels towards different destinations. More than one circuit (AAL1) entity share the same physical T1/E1 interface. In order to provide this service, AAL1 is capable of delineating repetitive fixed-size blocks of data (block size is the integral number of octets, where an octet represents a 64k channel). Synchronous service assumes that synchronized clocks are available on each end. Therefore, no clocking information is transported in the ATM cell. Propagation of the clock source throughout the network is required. Refer to An Introduction to Circuit Emulation Services for a more detailed explanation on CES Services.

## **Prerequisites**

### **Requirements**

There are no specific requirements for this document.

### **Components Used**

This document is not restricted to specific software and hardware versions.

### **Conventions**

Refer to Cisco Technical Tips Conventions for more information on document conventions.

# Configure

## Assumptions

In this section, you are presented with the information to configure the features described in this document.

The examples in this document are based on these assumptions:

- These examples use synchronous clocking.

**Note:** Synchronous clocking must be used for structured CES.

- PBX1, PBX2 and PBX3 are clocked from the same clock source from the service provider. In other words, this configuration assumes that the PBXes still connect to a common telephone network that provides an extremely stable and precise clock. Often, clocking ATM switches off the PBXes creates the most stable clocking configuration. See the Network Diagram.

One alternate clocking configuration is to derive a network clock source from the common ATM network. In this case, you configure each ATM switch with a network-clock-select 1 atm statement that references the ATM interface that connects to the network.

A second alternate configuration is to use a PBX as a primary reference source (PRS) to the ATM network. There are two primary ways in order to implement this:

- ◆ PBX1 feeds the clock to ATM switch1 and switch2. Switch3 gets the same reference clock from its direct connection to PBX2, which assumes both PBXes retain connections to a common telephone network with highly accurate clocking.

```
pbx1---<sw1---<sw2----sw3>---pbx2
```

- ◆ PBX1 feeds the clock to all three ATM switches. Both PBXes are clocked to a common service provider.

```
pbx1---<sw1---<sw2----<sw3---pbx2
```

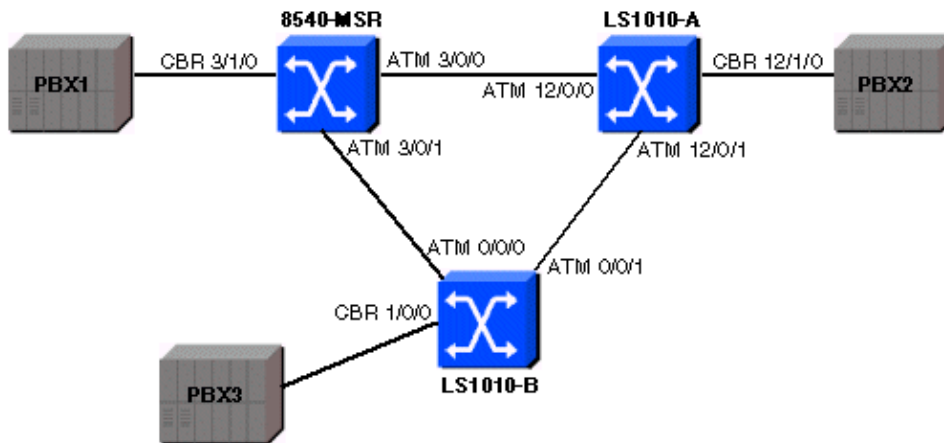
- Framing on all three PBXs is Extended Superframe (ESF). This is the default on the LS1010 so it does not need to be explicitly configured. But we configure it in this example for the sake of demonstration.
- The line-code on all three PBXs is binary 8-zero substitution (B8ZS). This is the default on the LS1010 so it does not need to be explicitly configured. But we configure it in this example for the sake of demonstration.
- There are four 6 x 64k circuits in this example:
  - ◆ two between Cisco 8540-MSR ATM switch and Cisco LightStream LS1010-A
  - ◆ two between 8540-MSR and LS1010-B
- 8540-MSR is the active side of all four soft PVCs; LS1010-A and LS1010-B are the passive side.
- The distance between the PBX and the ATM switch is less than 110 feet on the CES PAM. This length is the default line build-out (lbo) so it does not need to be explicitly configured. But we configure it in this example for the sake of demonstration.
- The LS1010 is equipped with a feature card per-flow queueing (FC-PFQ), which uses a phase lock loop (PLL) that is capable to lock onto and track the selected the clock source. This high quality, locked clock is then fed to the network clock interfaces in order to provide interface timing. The 8540 MSR is equipped with a Network Clock Module (NetClkMod), which offers the added advantage of a Stratum 3 clock source.

- The ATM Pseudo interfaces (ATM-Px/y/z) is created when the circuit is defined. Refer to Configuring Circuit Emulation Services for more details.

**Note:** Use the Command Lookup Tool ( registered customers only) in order to find more information on the commands used in this document.

## Network Diagram

This document uses this network setup:



## 8540-MSR Configuration

This document uses these configurations:

8540-MSR
<pre> 8540-MSR#show running-config Building configuration... Current configuration: ! version 12.0 no service pad service timestamps debug datetime msec service timestamps log datetime msec no service password-encryption service internal ! hostname 8540-MSR ! network-clock-select 1 cbr3/1/0 ! boot system flash bootflash:cat8540m-wp-mz.120-1a.W5.7.bin logging buffered 4096 debugging ! redundancy main-cpu no sync config startup sync config running facility-alarm core-temperature major 53 facility-alarm core-temperature minor 45 ip subnet-zero atm address 47.0091.8100.0000.0090.2144.8401.0090.2144.8401.00 </pre>

```

atm router pnni
no aesa embedded-number left-justified
node 1 level 56 lowest
redistribute atm-static
!
interface ATM3/0/0
no ip address
no ip directed-broadcast
!
interface ATM3/0/1
no ip address no
ip directed-broadcast
!
interface CBR3/1/0
no ip address no
ip directed-broadcast
ces aall service Structured
ces circuit 1 timeslots 1-6 circuit-name ls1010-a-1
ces pvc 1 dest-address 47.0091.8100.0000.0090.92b8.6401.4000.0c86.1030.10
vpi 0 vci 16
ces circuit 2 timeslots 7-12 circuit-name ls1010-a-2
ces pvc 2 dest-address 47.0091.8100.0000.0090.92b8.6401.4000.0c86.1030.20
vpi 0 vci 32
ces circuit 3 timeslots 13-18 circuit-name ls1010-b-1
ces pvc 3 dest-address 47.0091.8100.0000.0090.92b9.0023.4000.0c80.1030.10
vpi 0 vci 16
ces circuit 4 timeslots 19-24 circuit-name ls1010-b-2
ces pvc 4 dest-address 47.0091.8100.0000.0090.92b9.0023.4000.0c80.1030.20
vpi 0 vci 32
ces dsx1 linecode b8zs
ces dsx1 framing esf
ces dsx1 lbo 0_110
!
interface ATM0
no ip address
no ip directed-broadcast
atm maxvp-number 0
!
interface Ethernet0
no ip directed-broadcast
!
line con 0transport input noneline aux 0line vty 0 4login!end

```

Use **show ces address** on the passive side of the soft PVC in order to get the address and VPI/VCI pair that you need in order to configure the active side of the soft PVC, which is 8540-MSR in this example. See this sample output:

```
LS1010-A#show ces address
```

```

CES-IWF ATM Address(es):
47.0091.8100.0000.0090.92b8.6401.4000.0c86.1030.10 cbr12/1/0:1 vpi 0 vci 16
47.0091.8100.0000.0090.92b8.6401.4000.0c86.1030.20 cbr12/1/0:2 vpi 0 vci 32

```

```
LS1010-B#show ces address
```

```

CES-IWF ATM Address(es):
47.0091.8100.0000.0090.92b9.0023.4000.0c80.1030.10 cbr1/0/0:1 vpi 0 vci 16
47.0091.8100.0000.0090.92b9.0023.4000.0c80.1030.20 cbr1/0/0:2 vpi 0 vci 32

```

## LS1010-A Configuration

### LS1010-A

```
ls1010#show running-config
Building configuration...
Current configuration:
!
version 11.3
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname ls1010
!
!
network-clock-select 1 CBR12/1/0
!
atm address 47.0091.8100.0000.0090.92b8.6401.0090.92b8.6401.00
atm router pnni
no aesa embedded-number left-justified
node 1 level 56 lowest
redistribute atm-static
!
no ip address
!
interface CBR12/1/0
no ip address
ces aall service Structured
ces circuit 1 timeslots 1-6 circuit-name ls1010-a-1
ces circuit 2 timeslots 7-12 circuit-name ls1010-a-2
ces dsx1 linecode b8zs
ces dsx1 framing esf
ces dsx1 lbo 0_110
!
interface CBR12/1/1
no ip address
!
interface CBR12/1/2
no ip address
!
interface CBR12/1/3
no ip address
!
interface ATM13/0/0
no ip address
atm maxvp-number 0
!
interface Ethernet13/0/0
ip classless
!
line con 0
line aux 0
line vty 0 4
login
!
end
```

## LS1010-B Configuration

### LS1010-B

```
ls1010-B#show running-config
Building configuration...
Current configuration:
!
version 11.3
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname ls1010-B
!
network-clock-select 1 CBR1/0/0
!
atm address 47.0091.8100.0000.0090.92b8.6401.0090.92b8.6401.00
atm router pnni
no aesa embedded-number left-justified
node 1 level 56 lowest
redistribute atm-static
!
no ip address
!
interface ATM0/0/0
no ip address
interface ATM0/0/1
no ip address
interface CBR1/0/0
no ip address
ces aall service Structured
ces circuit 1 timeslots 1-6 circuit-name ls1010-b-1
ces circuit 2 timeslots 7-12 circuit-name ls1010-b-2
ces dsx1 linecode b8zs
ces dsx1 framing esf
ces dsx1 lbo 0_110
!
interface CBR1/0/1
no ip address
!
interface CBR1/0/2
no ip address
!
interface CBR1/0/3
no ip address
!
interface ATM2/0/0
no ip address
atm maxvp-number 0
!
interface Ethernet2/0/0
ip classless
!
line con 0
line aux 0
line vty 0 4
login
!
end
```

## Verify

There is currently no verification procedure available for this configuration.

## Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

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## Related Information

- [An Introduction to Circuit Emulation Services](#)
  - [ATM Switch Router Command Reference](#)
  - [ATM Technology Support Pages](#)
  - [Technical Support & Documentation – Cisco Systems](#)
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